

Intent

Science is recognised as a 'core' subject area at Al-Islamia, and as such, the content and delivery of this subject is focused and of appropriate breadth and depth to allow for exploration and engagement, and opportunity to develop skill and knowledge as young scientists.

Science is to be accessible to all, with teachers providing the scaffolding, support and challenge for individual pupils, with acute awareness of need and ability.

Over the last academic year, feedback and monitoring highlighted that scientific enquiry, while approached with the best of intentions, was not given as much consideration as the objectives for the 3 main science domains. We intend to ensure that units of work are approached with the scientific skills at the forefront, using investigations, research and questioning to drive the learning.

Ensuring the retainment of knowledge is also a focus for this academic year. We intend to support the retaining of scientific knowledge in long-term memory with strategies such as Rapid Recall.

The National Curriculum Framework for Science will be delivered to the children, based on their year group and the statutory requirements for each banding. MTP is linked to Hamilton Trust's resources, identified and selected for their specialism and recognised for their high-quality resources and activities.

During the Autumn term of the academic year, children in Year 1 will explore Science through the lens of themes. From the Spring term, they will have discrete unit coverage of scientific concepts.

The units and timetable have been organised to ensure that children explore NC14 units within their banding and meet age-related expectations by the Summer term. Teachers are encouraged to use their professional judgement and understanding of their pupils' knowledge and understanding of scientific knowledge and concepts to inform appropriate planning.

Implementation

Science will be taught once or twice a week to allow for further study and more opportunities to revisit and review learning. An enquiry-based approach has been discussed and implemented, which means that teachers will decide what scientific enquiries will be completed throughout the course of a specific unit of work, designed or selected to develop the necessary skills of questioning, comparing, researching and investigating their world as young scientists. The Enquiry-Based Learning Grid Template (Appendix 1) is completed prior to the commencement of each unit or for all units before teaching begins. Staff are encouraged to refer to the Hamilton Trust units and STEM.org.uk to complete this grid. This then informs the short-term planning and the learning experiences.

The enquiries are as follows:

Observe changes over time: Making careful observations of objects or events and how they change over time. *E.g. how do habitats change over the year? What happens to ice when it is heated up? How does exercise affect our pulse rates? How do our shadows change during the day? How does the shape of the moon change over the month? What happens to a puddle on a hot day? How do plants change as they grow? How does mould grow on different foods?*

We promote **IKHLAS**:

Inspiration – **Knowledge** – **Healthy Living** – **Leadership** – **Aspiration** – **Spirituality**

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Notice Patterns: observing and recording natural phenomena, carrying out surveys or collecting data from secondary sources. Then look to identify patterns in the data. *E.g. do taller plants grow from taller trees? Do tall people have bigger feet? are older children in our class taller? Do different insects live in different places? Which months are wettest? Do bigger musical instruments always make deeper sounds? Are all magnetic objects good electrical conductors?*

Grouping and Classifying: Identify features that allow things to be organised into distinct groups. Recognise things as part of a scientific group and name them. *E.g. is it a living thing or not? Can we identify everyone in our class by their fingerprints? Can we use keys to identify plants and animals? Which materials can be recycled? Can we identify which objects will sink and which will float? Can you sort the toys by how they are powered?*

Fair and Comparative Testing: Observing or measuring the effect of changing one variable whilst keeping other potential variables constant. *E.g. which materials make the best parachutes? Which surface provides the least friction? How does the temperature of water effect the rate at which sugar dissolves? Which paper towel soaks up more water? What does a plant need to grow? How can we make the light bulb brighter?*

Secondary Sources: Gathering and analysing scientific findings to answer a question or to provide background information to help explain observed events. Research can also show how scientists' ideas have changes over time as new evidence has been found. *E.g. what do different animals eat? How do we digest our food? How does blood travel around our bodies? Why does the moon change every night? How does an aeroplane fly? Where does glass come from and when did we start to use it? What will happen to the Earth as the Sun dies?*

Teachers have access to the Progression Map (Appendix 2) and will be expected to use this to understand how knowledge and content progresses in separate units over the years. This map should also help to identify gaps in knowledge and skills so relevant planning experiences can be put in place effectively and relevant to the children's needs and progress.

Progression is key in all areas of learning, including templates to plan investigations (Appendix 3) so vocabulary and format become familiar and instantly recognisable. Over time, the scaffolding within the templates and the support provided will be adapted to reflect progress and allow learners to demonstrate their ability to complete an enquiry from the planning stage through to the evaluation.

When planning teaching and learning activities, including the learning conversations, teachers should consider:

- The enquiry – each lesson should have a question that drives the learning
- The age-appropriate skills the children need to develop
- Key questions
- Gaps in knowledge
- Interactivity
- Key vocabulary
- Needs and learning abilities of the children as individuals
- The opportunity to discuss and use scientific language
- Required resources

A Subject Lead is now responsible for communicating the regular analysis and evaluation of the delivery of Science across the school with SLT and teaching staff. The Lead will review the Rapid Recall questions collated in a centralised bank that teachers can draw from to assess the knowledge and skills that children have learned and remembered.

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Impact

Science is a lesson that children look forward to and fully engage in. They are, on the whole, enthusiastic about sharing their learning, questions and ideas, and confident in their developing skills and knowledge. As they develop as scientists, their questions incorporate and reflect scientific vocabulary and thinking.

The content that is taught and repeatedly reviewed should reflect the National Curriculum Framework and the Knowledge Organisers.

Assessment for science is not regimented; teachers are free to plan assessment opportunities that they feel are most appropriate. Thus far, teachers have used assessment lessons where assessment takes the form of observations and direct questioning; summative assessments modelled off SATs style questions and oral assessments that allow teachers to assess the knowledge and understanding of learners that have low levels of literacy. The only requirements that teachers MUST follow are:

- Each unit of work must be assessed upon completion
- A record of the assessment, and the result must be archived in learner folders.
- Results must be recorded as per the Assessment Policy

The delivery of science is very strong at Al-Islamia. It is well-resourced and the CPD that we have delivered and directed staff to has ensured that staff are confident and familiar with progression, expectation of delivery and formative assessment. All staff are expected to review and update their subject knowledge, as well as specified courses as directed by the Lead and whole-school monitoring and priorities. Monitoring of the subject will be reviewed monthly and recorded on the Science Subject Leadership Management template.

Secondary sources, such as printed resources for research that were published over 10 years ago, have been removed from the school library. These are in the process of being replaced as budget allows, with priority to information books relating to units as they are being taught.

A QFT approach is integrated into the teaching practice at AL-Islamia to ensure that all children meet the standards and expectations for science. Staff are updated regarding need or EHP in order to ensure that support is specific and in line with the EHP. The engaging and stimulating nature of the lessons, and the enquiry-based approach has enabled teachers to include children of all abilities within the learning journey.

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Appendix 1 – Enquiry-Type Template

		Enquiry Type				
		Observe changes over time	Notice patterns	Grouping and classifying	Fair and comparative tests	Secondary sources
Unit Name	Circulatory System	Exercise activity: heart rate over time	Heart rate at different times of the day	The heart rate of different animals	Heart rate during different activities	
	Light					
	Electricity					
	Inheritance and Evolution					
	Classification					
	Scientists					

Appendix 2: Scientific Skills Progression Map

Sc1 Working Scientifically

YEARS 1&2	YEARS 3&4	YEARS 5&6
Asking simple questions and recognising that they can be answered in different ways	Asking relevant questions and using different types of scientific enquiries to answer them	
Performing simple tests	Setting up simple practical enquiries, comparative and fair tests	Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
Observing closely, using simple equipment	Making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers	Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.
Gathering and recording data to help in answering questions	Gathering, recording, classifying and presenting data in a variety of ways to help in answering questions	Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations
Identifying and classifying	Identifying differences, similarities or changes related to simple scientific ideas and processes	Identifying scientific evidence that has been used to support or refute ideas or arguments
	Recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables	Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
	Using straightforward scientific evidence to answer questions or to support their findings.	
Using their observations and ideas to suggest answers to questions	Using results to draw simple conclusions, make predictions for new values and suggest improvements and raise further questions	Using test results to make predictions to set up further comparative and fair tests
	Reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions	Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other presentations

SC2 Biology - Plants

YEARS 1&2	YEARS 3&4	YEARS 5&6
Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees	Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers	
Identify and describe the basic structure of a variety of common flowering plants, including trees	Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant	
Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.	Investigate the way in which water is transported within plants	
Observe and describe how seeds and bulbs grow into mature plants	Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.	Describe the life process of reproduction in some plants (and Animals, including humans)

Sc2: Biology Living Things and their habitats

YEARS 1&2	YEARS 3&4	YEARS 5&6
Explore and compare the differences between things that are living, dead, and things that have never been alive.	Recognise that living things can be grouped in a variety of ways Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment	Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants, and animals
Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other	Recognise that environments can change and that this can sometimes pose dangers to living things.	Give reasons for classifying plants and animals based on special characteristics
Identify and name a variety of plants and animals in their habitats, including micro-habitats.		Describe the life process of reproduction in some plants and animals
Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food.	Construct and interpret a variety of food chains, identifying producers, predators and prey.	

Sc2: Biology Animals, including humans		
YEARS 1&2	YEARS 3&4	YEARS 5&6
Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals		
Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)		
Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.	Identify that humans and some other animals have skeletons and muscles for support, protection and movement	
Find out about and describe the basic needs of Animals, including humans, including humans, for survival (water, food and air)		Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function. Describe the ways in which nutrients and water are transported within Animals, including humans, including humans
Notice that animals, including humans, including humans, have offspring which grow into adults		Describe the life processes of reproduction in some (plants) and Animals, including humans Describe the changes as humans develop from birth to old age Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird
Describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene.	Describe the simple functions of the basic parts of the digestive system in humans	Identify and name the main parts of the circulatory system , and explain the functions of the heart, blood vessels and blood .
Identify and name a variety of common animals that are carnivores, herbivores and omnivores	Identify that Animals, including humans, including humans, need the right types and amount of nutrition , and that they cannot make their own food; they get nutrition from what they eat	
	Describe the simple functions of the basic parts of the digestive system in humans	
	Identify the different types of teeth in humans and their simple functions	

Sc2: Biology Evolution & Genetics		
YEARS 1&2	YEARS 3&4	YEARS 5&6
		Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.
		Identify how Animals, including humans and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.
		Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.

Sc3: Chemistry The Earth : (Rocks, Atmosphere)		
YEARS 1&2	YEARS 3&4	YEARS 5&6
	Recognise that soils are made from rocks and organic matter	
	Describe in simple terms how fossils are formed when things that have lived are trapped within rock.	
	Compare and group together different kinds of rocks on the basis of their simple physical properties	

Sc3: Chemistry Materials		
YEARS 1&2	YEARS 3&4	YEARS 5&6
Distinguish between an object and the material from which it is made	Compare and group materials together, according to whether they are solids, liquids or gases	Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets
Describe the simple physical properties of a variety of everyday materials	Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C),	
Compare and group together a variety of everyday materials on the basis of their simple physical properties		Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic
	Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature	Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution. Demonstrate that dissolving, mixing and changes of state are reversible changes .
Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses (Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching)		Use knowledge of solids, liquids and gases to decide how mixtures might be separated , including through filtering, sieving and evaporating
		Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda

Sc4: Physics Motion and forces		
YEARS 1&2	YEARS 3&4	YEARS 5&6
Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.	Compare how things move on different surfaces	Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object
	Notice that some forces need contact between two objects, but magnetic forces can act at a distance	Identify the effects of air resistance, water resistance and friction, that act between moving surfaces
		Recognise that some mechanisms, including gears, pulleys, levers and springs, allow a smaller force to have a greater effect

Sc4: Physics Waves: Light		
YEARS 1&2	YEARS 3&4	YEARS 5&6
	Notice that light is reflected from surfaces	Recognise that light appears to travel in straight lines
	Recognise that light from the sun can be dangerous and that there are ways to protect their eyes	Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye
	Recognise that they need light in order to see things and that dark is the absence of light	Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes.
	Recognise that shadows are formed when the light from a light source is blocked by a solid object	Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.
	Find patterns that determine the size of shadows.	

Sc4: Physics Waves: Sound		
YEARS 1&2	YEARS 3&4	YEARS 5&6
	Identify how sounds are made, associating some of them with something vibrating. Recognise that vibrations from sounds travel through a medium to the ear.	
	Find patterns between the pitch of a sound and features of the object that produced it. Find patterns between the volume of a sound and the strength of the vibrations that produced it.	
	Recognise that sounds get fainter as the distance from the sound source increases	

Sc4: Physics Magnetism		
YEARS 1&2	YEARS 3&4	YEARS 5&6
	Notice that some forces need contact between two objects and some forces act at a distance	
	Compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials.	
	Observe how magnets attract or repel each other and attract some materials and not others	
	Describe magnets as having two poles	
	Predict whether two magnets will attract or repel each other, depending on which poles are facing	

Sc4: Physics Electricity		
YEARS 1&2	YEARS 3&4	YEARS 5&6
	Identify common appliances that run on electricity	
	Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers	Use recognised symbols when representing a simple circuit in a diagram
	Identify whether or not a lamp will light in a simple series circuit based on whether or not the lamp is part of a complete loop with a battery	Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit
	Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit	Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.
	Recognise some common conductors and insulators, and associate metals with being good conductors.	

Sc4: Physics Earth & Space		
YEARS 1&2	YEARS 3&4	YEARS 5&6
Seasonal changes: Observe changes across the four seasons Observe and describe weather associated with the seasons		Describe the movement of the Earth and other planets relative to the Sun in the solar system
		Describe the movement of the Moon relative to the

Sc4: Physics Energy		
YEARS 1&2	YEARS 3&4	YEARS 5&6
		Understand that force and motion can be transferred through mechanical devices such as gears, pulleys, levers and springs



PLAN

We are investigating	
The variables we could change 	The variables we could measure/observe
We will change	We will measure/observe
Our question is... If we change what will happen to ?	
To make it a fair test we will keep these factors the same 	Our predictions are.....





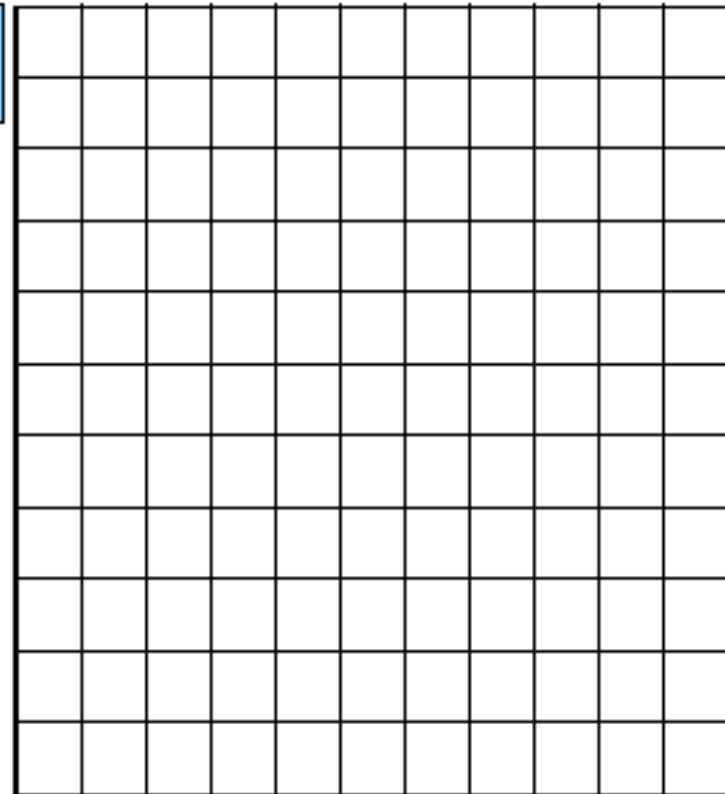
Table of results

We will change 	We will measure/observe 

DO

Our graph.....

Measure



Change

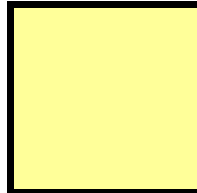




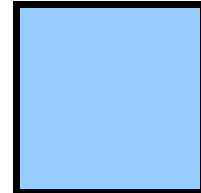
REVIEW

Our question is...

When we change



what will happen to

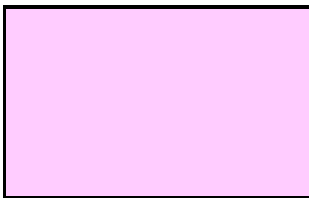


?

Which prediction most closely supports the results?



Can you **describe** how?



Can you **explain** why?



Can you **explain** why using scientific language?

Are there any unusual results? Can you explain why?

Have you answered the question?

What have you found out?

Our **conclusion** is.....

What can you do to improve your investigation?

How could you change your plan to obtain better results?